

BIO

# BIOTECHNOLOGY AND FARMING

What have the  
Government's  
Advisers  
been saying?

biotechnology  
commission



ment  
on (AEBC)

Government's independent adviser on developments  
in biotechnology and their implications for agriculture  
and the environment



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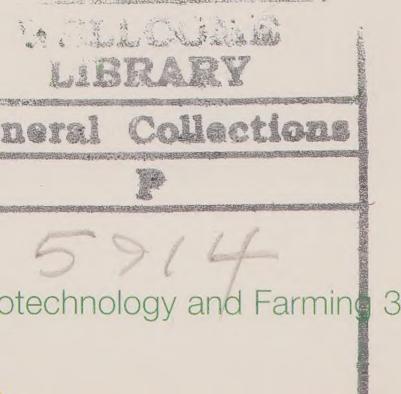
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9 NOV 2004

This booklet brings together what the Biotechnology Commission (AEBC) has been saying in its three major reports to Government on GM issues.

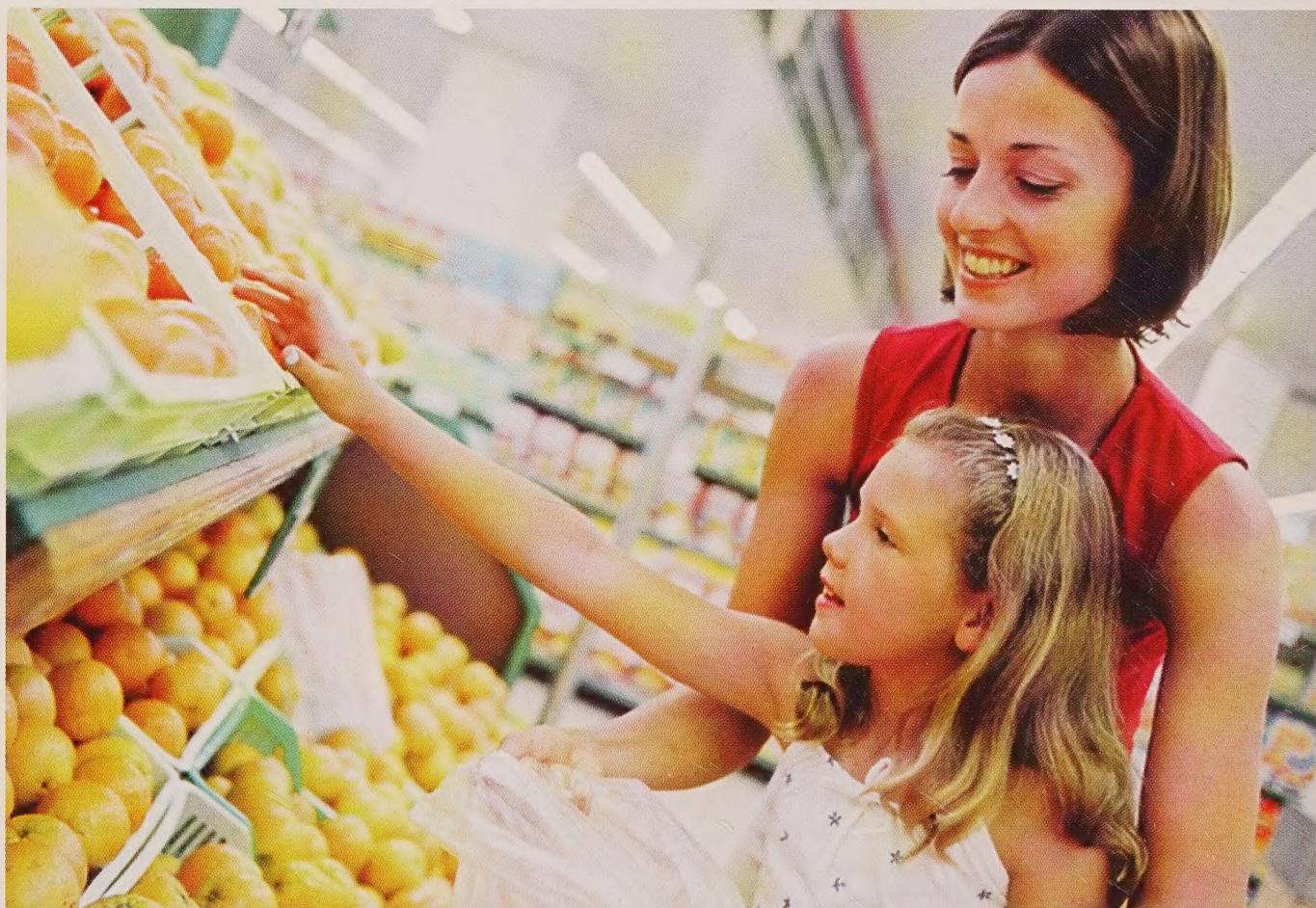


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# What have the GM Advisers been saying?

What is the future for genetically modified (GM) crops and animals in our farms and GM food in our supermarkets? Should we have them here in Britain – and if we do how is it to be managed?



# Government's view? What's



Views of the great revolution in biotechnology which has produced GM crops tend to be strongly held and deeply polarised. Many people want Britain to press ahead and remain at the forefront of this exciting new technology. Many others are deeply concerned and deeply against GM crops coming here or determined that very rigorous controls are put in place if they do.

It's the job of the **Biotechnology Commission**<sup>1</sup> (AEBC) to advise the Government on what to do. It is an unusual body – strongly independent although Government funded – made up of representatives with a wide range of skills and expertise from all sides of the GM argument : scientists, people from the biotech industries, green campaigners, lawyers and academics including a philosopher.

At the moment there's no immediate prospect of GM crops coming to our farms. The Government did recently agree to consider GM crop applications case by case and, as a beginning, to allow one kind of maize – genetically modified to cope with herbicides – to be grown here subject to strict conditions. However because of these conditions the manufacturers decided not to go ahead, saying that the GM variety had become outdated. (Varieties only last a few years before they are surpassed by other new varieties).

The Commission has been advising Government on GM issues since 2000 and has so far produced three major reports :

- **Crops on Trial** (September 2001) – which looked at the GM crop trials (FSEs) and how their results should be handled

<sup>1</sup> Agriculture and Environment Biotechnology Commission (AEBC)

## What have the Government's Advisers been saying? (CONTINUED)

- **Animals and Biotechnology**

(September 2002) – which looked at genetically modified animals

- **Coexistence and Liability** (November 2003) – which considered how GM

crops might be grown to minimise unintended mixing with other crops, how compensation should be paid if this should ever happen, and how we might deal with long-term, unforeseen environmental problems.

A constant theme of all the Commission's reports has been that the public needed to be consulted about the possible arrival of GM crops and GM food – and to do that they had to be properly informed about the facts and the issues involved.

The Commission was the driving force behind last year's national GM debate "GM Nation?" which reported to the Government in September 2003. When the results were analysed they

showed that people were generally apprehensive about the possible arrival of GM crops, although many people did see potential benefits.

In its reports the Commission has always stressed the need for careful monitoring and regulation should GM crops be planted or GM animals developed on Britain's farms to take account of possible damage to the environment or unintended mixing with conventional and organic produce.

It has also been concerned that British shoppers should be able to choose whether they wanted to buy GM produce or GM food. For consumers to make an informed choice, all products need to be clearly labelled.



# Crops on Trial

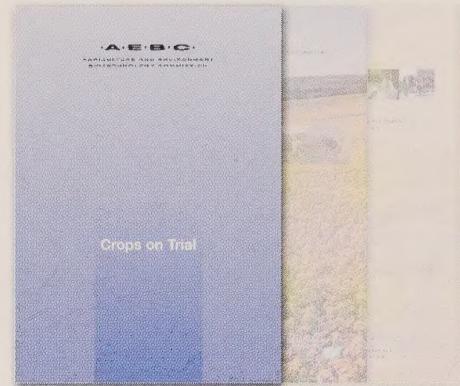
This investigation took place in 2002 at the height of the Government sponsored Farm Scale Evaluations (FSEs). GM crops designed to be tolerant to specific weedkillers were grown experimentally in different parts of the country to see whether growing them had any effects on biodiversity – that is on the numbers and variety of local plants, animals and wildlife – compared to conventional varieties of the same crop.

The trials themselves were a set of scientific investigations involving several kinds of crops – oilseed rape, beet and maize, each sown in fields of different sizes across the country, each field split half and half between the GM crop and an equivalent conventional variety.

The Commission found that the public were confused about the crop trials themselves; although the trials were looking at only one of the possible effects of growing GM crops, many people mistakenly thought they were being held to find out whether the crops being tested

were safe. They thought that the results, taken on their own, would determine whether or not commercial growing should go ahead.





This led the Commission to the conclusion that there was a need for full public discussion of all the ecological, economic and ethical issues involved and that the Government should recognise the divided views over GM rather than try to hide them. We recommended a GM national debate before Government came to a decision. It needed to be a debate of a new and innovative kind and to be analysed by social scientists to find out what people really felt when they were properly informed of all the issues.

Because of current public concern and scepticism over previous government statements, we said that Government should tell the public clearly and openly what scientific evidence was being assessed as the basis for its decisions on GM crops. The Commission called for an independent scientific review of all the scientific information to be used in addition to the results of the FSEs. The Government also needed to consider economic and ethical issues.

We called for a national GM debate run in parallel with an independent scientific review and a study of economic benefits of GM crops.

## The Government response

Margaret Beckett, the Secretary of State for Environment, Food and Rural Affairs later announced that she accepted the Commission's report and that there would be a national GM debate run in parallel with an independent scientific review and a study of economic benefits of GM crops. The debate was held in the summer of 2003.

# Animals and Biote

The Commission's second major investigation looked at what GM and cloning can do – or potentially could do - for animals, birds and fish. We considered what future applications of biotechnology to animals might be acceptable to the public and what regulations might be needed. Our major proposal – still before the Government – was for a new national strategic body to look at GM animals and cloning. And we called for a complete overhaul of all the laws governing GM animals – many of them dating back to 1911 when biotechnology was hardly thought of.

We began by examining the many ways animals are or could be genetically modified or cloned for all kinds of purposes. At the moment the principal area is medical and biological research (almost all of the animals involved being GM mice), to provide animals which model human diseases, help to explain fundamental human biology, or to test the effect of chemicals and drugs. DNA vaccines are in the pipeline and likely to be more effective than conventional ones.

Also getting under way is “pharming” - breeding animals which produce pharmaceutical or other useful products and deliver them in their milk, urine or eggs. Farm animals such as sheep and hens are already being used in this way to develop treatments for cystic fibrosis, heart attacks and haemophilia. Similarly, goats could be genetically modified to create spiders’ silk in their milk. This silk is exceptionally strong: it can stitch wounds as well as be used in body armour.

# Technology

Other current possibilities are “super fish” – which grow much faster than normal fish and can even be made to glow.

Possibilities on the horizon include GM insects (to check the spread of diseases), and xenotransplantation (transplanting tissue and organs between species, including animal tissue into humans, using GM technology to minimise rejection).

Theoretically it would also be possible to create a clone of a much loved pet or make super horses, perhaps capable of winning the Derby every time.



Theoretically it would also be possible to create a clone of a much loved pet.



## Our conclusions and recommendations

We found that the public were deeply concerned about some of these developments: they were strongly influenced by the purpose for which GM or cloned animals were being used, and whether they thought it useful or ethical. They were worried about possible harm to animals and about destroying the "integrity" and the basic qualities of an animal species. They were worried too about the sheer speed of the changes in animals which new technologies were making possible. Above all, people had little confidence in Government and business to regulate the introduction of these new or altered animals.

Because the subject provokes such strong feelings, we thought there should be a new source of independent advice to Government and a new way of creating dialogue with the public. We called for a new strategic advisory body to examine all the issues raised by the use of genetic biotechnology on animals and creatures of all kinds, taking into account current livestock farming practices.

The Government is still considering this recommendation.

We recommended that existing laws covering animal welfare – including legislation dating back to 1911 – should be updated and that the current complex, piecemeal system should be made simpler and more streamlined.

We thought it particularly important to plan how to monitor cloned and GM farm animals, if they enter commercial production, because there might be unexpected health or welfare problems with adult animals, and to think about how to allow consumers to continue to buy animal products from non-GM or non-cloned animals. That would entail a robust segregation and labelling system.

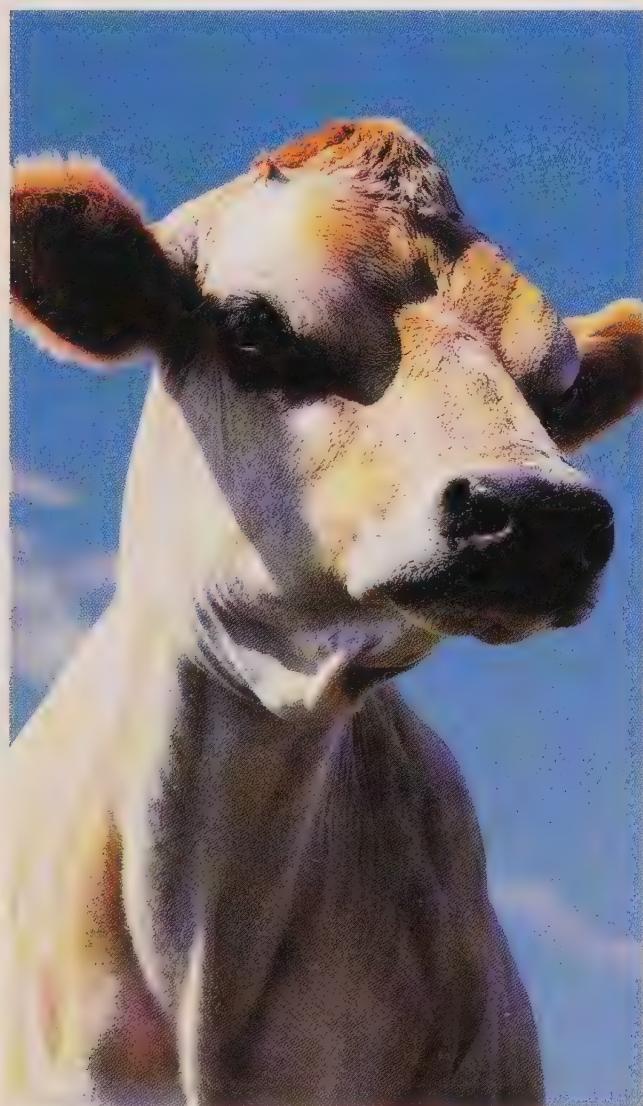
We considered that the commercial production of GM fish raised more environmental concerns than that of GM farm animals, because it is much easier for

We called for a new strategic advisory body to examine all the issues raised by the use of genetic biotechnology on animals.



fish to escape from the net pens used in fish farms. The impact of such escapes is still uncertain. For that reason we said that GM fish should not be raised in offshore net pens, unless and until the regulatory

authorities are satisfied that their security and the risk to the environment are properly addressed. The release of GM insects into the environment also needed to be considered very carefully.



### The Government response

In response, the Secretary of State, Margaret Beckett, announced the formation of a working party to examine our recommendation for a new statutory body.

She announced plans to consolidate and update all the piecemeal laws on animal welfare, covering both GM and non-GM animals and she agreed that there should be monitoring of GM and cloned farm animals if they were bred on a commercial scale.

She also agreed with our recommendation against keeping GM fish in offshore pens.

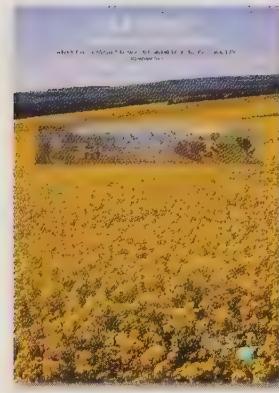
# Coexistence and L

This was the Commission's third major report and the most difficult on which to reach agreement. It was concerned with issues like how GM crops might be grown in order to minimise unintended mixing with non-GM crops and their products.

It reflected strongly-held different views amongst ourselves and amongst the public, about whether and how GM crops and products could be cultivated and marketed alongside non-GM ones, and about who should put things right, or pay compensation, if GM crops should cause someone an economic loss or cause damage to the environment.

We felt that strict rules needed to be put in place for growing GM crops to deliver coexistence, and the success of these rules should be carefully monitored. If coexistence arrangements did not work, we proposed that farmers should be compensated for financial loss.

# ability



There was considerable argument about what level of regulation would be needed if commercial planting were to begin – as the Government has now agreed in principle subject to strict regulation. The strongest argument was over exactly what precautions would be needed to stop the new GM crops becoming mixed with conventional and organic crops.

We also considered how consumers would be able to go on choosing to buy non-GM or organic produce from the UK and to know for sure what they were buying.

We looked at the closely allied issue of liability – how would compensation be paid if things went wrong? No crop can ever be 100 per cent pure. All crops have some foreign material (other crops, weed seed, insect parts). What would happen if GM material accidentally got into a non-GM crop or an organic crop?

That could cause a loss for the farmer concerned, because once a product contains more than the threshold level of

0.9 per cent of GM material it has to be classified as GM under EU law. When that happens the crop could become less valuable, because GM is still unpopular with many consumers and therefore less in demand and retailers pay less for it. Who would pay for that loss?



# The Reports – Coexistence and Liability

Just as important as these questions is the issue of environmental liability: who would be held responsible if GM caused unexpected damage to the environment?

Coexistence is especially an issue for organic farmers as EU law prohibits the use of Genetically Modified Organisms (GMOs) in organic production. The organic movement has a strong ideological and commercial interest in maintaining the image of organic produce and believes that GM technology is incompatible with it. It strives generally for a GM content of zero (which tends to be translated to a threshold of no more than 0.1 per cent GM material in organic produce – about the lowest level that can practically be detected).

How would compensation be paid if things went wrong?

Who would be held responsible if GM caused unexpected damage to the environment?

A variety of measures such as setting minimum separation distances to reduce cross-pollination can keep down the impact of GM crops on organic crops to below a certain threshold. But they cannot guarantee the zero GM content which the organic movement wants. If a GM presence did get into a crop, and it lost its organic status that would create a loss for the farmer concerned, who would pay for it?



## Conclusions and recommendations

We said that Government policy on the coexistence of GM and other crops should do everything possible to provide and preserve consumer choice, but at the same time allow farmers to respond to changes in demand at home and abroad.

Because of present consumer attitudes and market conditions, we felt that coexistence would not be possible without enforceable rules in place. Commercial growing of

GM crops would require some kind of crop management protocols, designed to achieve at least the 0.9 per cent threshold.

For example, we called for a separation distance of at least 24.5 metres for GM maize, a high degree of seed purity and thorough cleaning of farm machinery to prevent seed mixing, and suggested planting barrier rows to cut down cross-pollination.



## Conclusions and recommendations (CONTINUED)

Any protocols would need some legal backing but at the same time should be flexible enough to allow farmers to change their detailed practices when new scientific evidence came to light. Different crops might need different separation distances or other controls.

We could not agree on how coexistence arrangements should work for organic and other farmers who wanted to ensure their products contained no more than 0.1 per cent GM. Some members felt that this very minimum threshold might be a reasonable target, others thought it was unachievable. All members agreed that 0.1 per cent might eventually become impossible if GM crops were to be widely cultivated.

What was needed was very close monitoring at the start. We recommended that if GM crops were grown commercially, there should be an initial period with intensive monitoring and auditing. If in that initial period data showed that coexistence was not working effectively, and consumer choice not being delivered,

the Government should be able to change regulations quickly and suspend production of any GM crop, until the problems could be overcome.

If coexistence arrangements did not work, we agreed that farmers should be compensated for financial loss if their produce exceeds the legal threshold for GM presence through no fault of their own.

In principle, insurance was the best way to do this but it was clear the insurance companies would not provide cover – at least at first. In an initial phase there would need to be a special compensation scheme. But who would provide it? There were various possibilities – the Government, the biotech companies, the farmers or perhaps all farmers through a levy on crops harvested. Some argued that organic farmers should pay for anything below the 0.9 per cent threshold, as they were the people who had insisted on lower thresholds in the first place.

If GM crops were grown commercially, there should be an initial period with intensive monitoring and auditing.

If coexistence arrangements did not work we agreed that farmers should be compensated for financial loss.

We also looked at environmental liability, and who would be responsible if any use of GM crops caused harm to the environment. We said that the Government should use the EU argument – that “the polluter pays” – as the basis for compensation. That would mean amending UK law to end the requirement for a criminal conviction against people who damage the environment before they can be held responsible for cleaning up that damage. Some members felt that the agricultural biotechnology industry – not the Government or the taxpayer – should contribute to a fund to meet any environmental costs which could not be recovered from the person who caused the damage.



## The Government response

The Secretary of State, Margaret Beckett responded by agreeing to our recommendation to put in place rules for growing GM crops to deliver coexistence, and to monitor the success of these rules carefully. She announced that the Government would consult on a lower threshold level for organic produce and also on options for providing compensation to non-GM farmers who suffer financial loss through no fault of their own. (Although she said any compensation scheme would need to be funded by the GM sector itself, rather than by Government or producers of non-GM crops.) Government is still considering our proposals on environmental liability and an official response to all our recommendations on coexistence and liability is expected soon.

# What is Biotechnology?

Biotechnology covers a range of developments and techniques which use current knowledge of molecular biology to adapt living organisms. The best-known of these – and the most sensitive at present – is genetic modification (GM) of plants, crops and living creatures of all kinds, including cloned animals.

However, biotechnology has been around for hundreds of years, for example using yeast in bread or bacteria in yoghurt. Even today, biotechnology encompasses a great deal more than just genetic modification. There are developments in non-GM crop improvement technology, using cutting-edge molecular genetics, which are every bit as powerful as GM. There are also modern developments in agricultural practice that are less obviously categorised as biotechnology, such as diagnostic techniques to improve the targeting of pesticide applications.

Biotechnology provokes intense discussion across the world on what products, especially GM products, ought to be developed and under what conditions. It raises big issues not just about the future of agriculture, the environment, food and health, but also about the power of consumers and the public to shape their future, and philosophical and ethical issues about man's relationship with nature itself.



# What the Commission does

Set up in June 2000, we have the job of reviewing current and future developments in biotechnology which could make an impact on agriculture and the environment, and advise Government on whether they are ethically, socially and publicly acceptable. A major part of our job is to find out what issues concern the public and make decision-makers aware of them.

We also have an important role to play in looking ahead to keep under review possible future developments in biotechnology and their implications for agriculture and the environment. (We carried out a "horizon scanning" exercise in 2002 and this is available on our website.)

The AEBC is an unusual body – strongly independent although Government funded. Our 20 members come from many different backgrounds – including the agricultural biotechnology industry,

environmental groups, academic bodies, law, philosophy, social research and consumer affairs. Positions are advertised and open to all, with members appointed for their personal contributions rather than as representatives of any particular organisation.

We hold five main meetings a year, alternately in London and elsewhere recently including Belfast, Edinburgh, Cardiff and the Eden Project in Cornwall. Unless we are dealing with an internal issue, we meet in public and anyone can come. We also have regular dialogue with many interested groups and are constantly looking for new ways to engage with the general public. We publish minutes of our meetings and notice of future meetings on our website, together with draft reports, discussion papers, correspondence and press statements.

# Membership details

## CHAIR

**Professor Malcolm Grant CBE**  
Provost and President University  
College London

## DEPUTY CHAIR

**Julie Hill MBE**  
Programme Adviser and former Director  
of Green Alliance

## MEMBERS

**Anna Bradley**  
Consumer Affairs Director for the Financial  
Services Authority

**Helen Browning OBE**  
Tenant Farmer, Eastbrook Farm; Founder  
and Director of Eastbrook Farm Organic  
Meats Ltd

**Dr David Buckeridge**  
Business Director of Advanta Seeds,  
responsible for European and North  
American operations

**Dr David Carmichael**  
Arable farmer with an interest in  
non- food crops

## Professor Philip Dale

Leader of the Genetic Modification and  
Biosafety Research Group at the John  
Innes Centre, Norwich

## Dr Ed Dart CBE

Chairman of Plant Bioscience Ltd

## Dr Matthew Freeman

Senior Researcher at the Medical  
Research Council Laboratory of  
Molecular Biology

## John Gilliland OBE

President of the Ulster Farmers Union and  
arable farmer with a particular interest in  
sustainable production systems and the  
pioneering of non- food crops.

## Professor Robin Grove-White

Professor of Environment & Society,  
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## Dr Rosemary Hails MBE

Ecologist, and Principal Scientific Officer,  
Centre for Ecology and Hydrology Oxford  
and lecturer at St Anne's College Oxford

**Judith Hann**

Freelance broadcaster and writer who presented Tomorrow's World for 20 years

**ChiChi Iweajunwa**

Member of executive evaluation group for NHS Direct, and member of Partners Council for NICE (National Institute for Clinical Excellence)

**Dr Derek Langslow CBE**

Scientist specialising in nature conservation/biodiversity and former Chief Executive of English Nature

**Professor Keekok Lee**

Visiting Chair in Philosophy, Institute for Environment, Philosophy and Public Policy, Lancaster University

**Professor Jeff Maxwell OBE**

Former Director, Macaulay Land Use Research Institute

**Dr Sue Mayer**

Executive Director of Genewatch UK

**Dr Paul Rylott**

Former Chairman of the Agricultural Biotechnology Council (ABC) and former Head of BioScience UK at Bayer CropScience

**Justine Thornton**

Barrister specialising in environmental law at Allen and Overy Solicitors

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